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By: Wm. Stein

Date: May 12, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Heinrich Brunner et al.
Applic. No. : 09/816,927
Filed : March 23, 2001
Title : Semiconductor Component Having Field-Shaping Regions
Examiner : Kiesha L. Rose
Group Art Unit : 2822

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R E S P O N S E

Hon. Commissioner of Patents and Trademarks

S i r :

Responsive to the Office action dated February 12, 2003, the following remarks are made.

Reconsideration and allowance of claim 1-20 are solicited.

Claims 1-20 remain in the application.

In the third paragraph on page 2 of the above-identified Office action, claims 12-20 have been rejected as being indefinite under 35 U.S.C. § 112, second paragraph.

More specifically, the Examiner has stated that "[c]laims 1-20 disclose a channel electrically connecting parts of a semiconductor body separated by semiconductor regions. This limitation is not disclosed in the specification and therefore is considered new matter." (Strictly speaking, any "new matter" should be subject of a rejection under 35 U.S.C. § 132 and not under 35 U.S.C. § 112).

According to a telephone conversation on April 29, 2003, between the Examiner and Counsel, the Examiner did not receive the preliminary response filed in the Patent Office on December 13, 2002. Therefore, the arguments brought forward in the preliminary response are repeated below.

In the second paragraph on page 8 of the response filed October 31, 2002, Applicants stated:

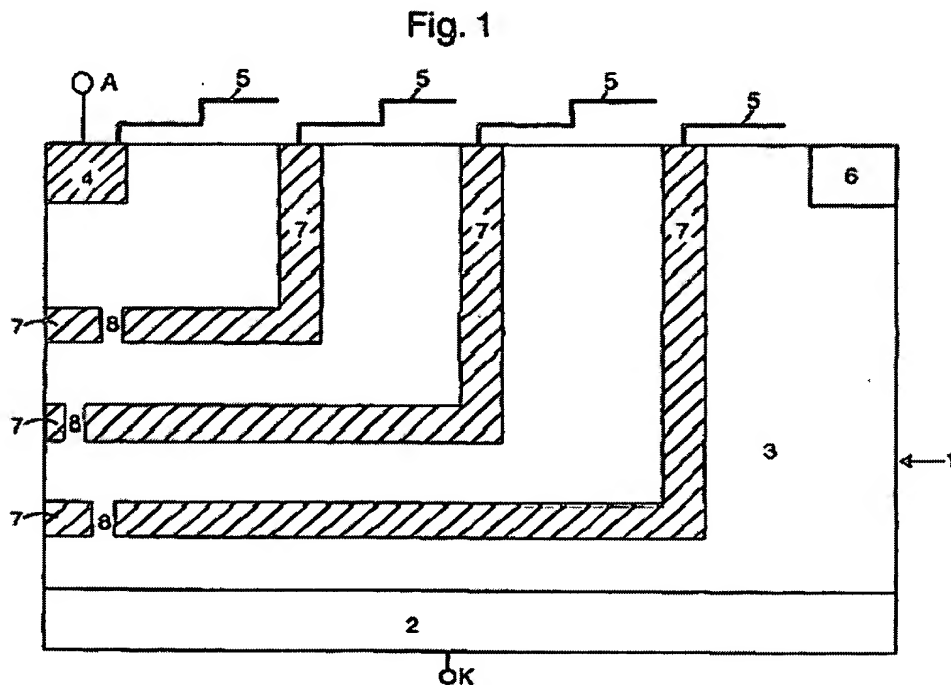
The rejection has been noted and claims 1, 11, and 12 have been amended to recite "said channels electrically connecting parts of said semiconductor body separated by said semiconductor regions" in an effort to even more clearly define the invention of the instant application. Support for the changes can be found on page 9, lines 20-25, of the specification.

The last paragraph (lines 20-26) on page 9 of the specification states:

The **channels** of the **first** conductivity type which are **routed** between the **regions** of the **second** conductivity type **connect**, as has been explained above, the **zones** of the **first** conductivity type which are created by these regions, with the result **that the operating current can flow through the channels**. These channels, then, should be configured in such a way that no spikes of the electric field occur in them.

(emphasis added)

Fig. 1 of the instant application is re-produced below:



The above-noted passage, particular in combination with the above-noted Fig. 1, is believed to clearly show the subject-matter of the amendment: Channels (reference sign 8) - which are formed by a semiconductor body (reference sign 3) of a first conductivity type - electrically connecting parts of the

semiconductor body separated (except for the channels 8 formed by the semiconductor body 3) by semiconductor regions of a second conductivity type (reference sign 7).

It is accordingly believed that the claims meet the requirements of either 35 U.S.C. § 112 or 35 U.S.C. § 132. Should the Examiner find any further objectionable items, Counsel would appreciate a telephone call during which the matter may be resolved.

In the first paragraph on page 3 of the Office action, claims 1-3, 5-7, 10-14, 16-17, and 20 have been rejected as being obvious over *Nishizawa et al.* (US 5,175,598) in view of *Stengl* (US 5,113,237) under 35 U.S.C. § 103.

In the second paragraph on page 4 of the Office action, claims 4 and 15 have been rejected as being obvious over *Nishizawa et al.* and *Stengl* in view of *Siergiej et al.* (US 5,945,701) under 35 U.S.C. § 103.

In the second paragraph on page 5 of the Office action, claims 8-9 and 18-19 have been rejected as being obvious over *Nishizawa et al.* and *Stengl* in view of *Notley* (US 5,324,971) under 35 U.S.C. § 103.

In the *Response to Arguments* on page 6 of the Office action, the Examiner stated that:

Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection. In regards to the amendment made 31 October 2002 to claims 1, 11 and 12 referring to the channel electrically connecting parts of a semiconductor body separated by semiconductor regions. As stated previously in the advisory action dated 14 November 2002, this limitation is still considered new matter because the excerpt from the specification that is suppose to disclose this limitation still does not show what is being claimed.

From the Examiner's comments, it is believed that the Examiner maintained the prior art rejections because of the § 112 rejection, giving certain recited features of the claims no patentable weight.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 12 (similarly claims 1 and 11) calls for, inter alia:

each one of said semiconductor regions **being interrupted** at at least one location **by channels** formed by said semiconductor body, said **channels electrically**

connecting parts of said semiconductor body separated by said semiconductor regions

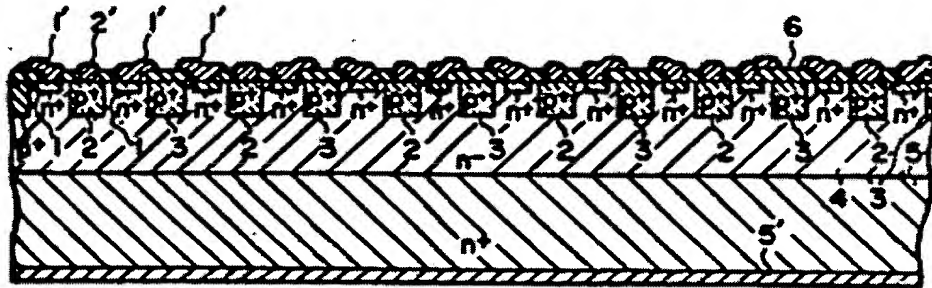
The Examiner stated in the paragraph bridging pages 3 and 4 of the Office action that "Nishizawa discloses all of the limitations except for the semiconductor body having a doping concentration greater than 5×10^{13} charge carrier cm^{-3} .

Whereas Stengl discloses ... a semiconductor body (1) with a doping concentration of 10^{18} cm^{-3} to properly form conductive regions."

However, *Nishizawa et al.* also do not disclose or suggest at least one very important feature of the recited invention. *Nishizawa et al.* do not disclose or suggest a semiconductor region of a second conductivity type **surrounding** the semiconductor zone **except** for a channel formed of a semiconductor of a first conductivity type which also electrically connects parts of the semiconductor body otherwise being electrically separated from each other by the semiconductor regions. *Nishizawa et al.* state in col. 2, lines 55-59, "there is disposed a ... p+ type semiconductor region 3 ... so as to surround a plurality of individual portions of the n- type semiconductor layer 4." No "channel" connecting parts of a semiconductor body separated by semiconductor regions is either disclosed or suggested in

Nishizawa et al.. The lack of "channels" can be clearly seen in Fig. 2 of Nishizawa et al., reproduced below.

FIG. 2



The inventive concept of the invention of the instant application is to avoid large reverse currents despite high applied voltages by using a semiconductor component having a semiconductor layer with a doping concentration greater than 5×10^{13} charge carriers cm^{-3} in combination with a semiconductor region of a second conductivity type *surrounding* the semiconductor zone *except* for a channel formed of a semiconductor of a first conductivity type. The applied references neither suggest nor contain the relevant teaching that would suggest such a semiconductor component. Therefore, the invention as recited in claims 1, 11, and 12 of the instant application is also believed not to be obvious over the cited references.

It is accordingly believed to be clear that Nishizawa et al. in view of Stengl do not suggest the features of claims 1, 11, and 12. Claims 1, 11, and 12 are, therefore, believed to be

patentable over the art and since claims 2-10 and 13-20 are ultimately dependent on either of claims 1 and 12, they are believed to be patentable as well.

Considering the deficiencies of the primary reference *Nishizawa et al.*, it is believed not to be necessary at this stage to address in more detail the secondary reference *Stengl* or the secondary references *Siergiej et al.* and *Notley* applied in the rejection of the dependent claims, and whether or not there is sufficient suggestion or motivation with a reasonable expectation of success for modifying or combining the references as required by MPEP § 2143.

In view of the foregoing, reconsideration and allowance of claims 1-20 are solicited.

If an extension of time is required, petition for extension is herewith made.

Please charge any fees which might be due with respect to
Sections 1.16 and 1.17 to the Deposit Account of Lerner and
Greenberg, P.A., No. 12-1099.

Respectfully submitted,



For Applicants

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